

# GROUND POUNDER

## Lockheed UGV meets squad-level needs

ANDY NATIVI • GRAND PRAIRIE, TEX.

**T**he U.S. Army's Future Combat Systems (FCS) program has an unmanned ground vehicle in the works for combat brigades—the Multifunctional Utility/Logistics and Equipment vehicle, or Mule, in development here by Lockheed Martin Missiles and Fire Control. Work on the Mule hasn't stopped Lockheed from developing another, smaller robot vehicle on its own initiative, the Squad Mission Support System (SMSS), for use by an Army or Marine Corps infantry squad or special forces team.

The SMSS is a 6 X 6 wheeled vehicle designed to be a self-navigating platform with multimission capabilities ranging from equipment transport and surveillance to fire support. It is smaller than the Mule and will probably cost about two-thirds or less than that vehicle.

Lockheed's goal is to have the Pentagon create an operational requirement for a light robotic vehicle that could

rapidly transition from development to series production. The SMSS could be ready for series production as soon as 2012. Lockheed forecasts a potential market of around 4,000 SMSS-type vehicles in the U.S. and abroad.

The vehicle has gone through various design changes since its unveiling at the Assn. of the U.S. Army show in 2006, and is slated to be deployed to Afghanistan late this year or early in 2010 for field testing.

The SMSS is intended to be a small, relatively cheap robotic vehicle that carries the gear of an infantry squad or special forces team and follows troops almost everywhere, on roads or over terrain. Since it is the result of a company-funded initiative, the platform is now a commercial 6 X 6 all-terrain vehicle, with a diesel engine, conventional suspension and run-flat tires.

The vehicle is 3.3 meters (10.8 ft.) long, 1.98 meters wide and 1.83 meters high.

It weighs around 4,000 lb., within the threshold for tactical and strategic deployment airlift needs. The SMSS can be carried inside heavy-lift helicopters such as the CH-47 or the CH-53, or sling-carried by a medium-lift helicopter like the UH-60 Black Hawk. The payload is 1,200 lb., and side racks may be added for easy hanging and retrieving of rucksacks.

It negotiates terrain like sand and rubble, clears vertical obstacles 55 cm. (21.6 in.) high, crosses gaps 70 cm. wide and fords water 50 cm. deep. No decision has been made about making it amphibious beyond a preliminary assessment.

The hull probably will be optimized to reduce the effects of mines, improvised explosive devices and other roadside explosives, and to add space for more electronics or fuel.

The vehicle's range is 480 km. (300 mi.) on roads and 320 km. off-road.

Since the SMSS will mostly travel with ground troops, it does not need to be fast. Nevertheless, it accelerates rapidly and can move faster than dismounted soldiers.

The SMSS has basic artificial intelligence capabilities—operating functions are adequate but neither extensive nor complex. Its vision, based on laser detection and radar (ladar), thermal imaging and TV sensors, has a range of around 70 meters.

The combat vehicle can be directly operated, teleoperated, remotely controlled or operated in autonomous or semi-autonomous modes. The light-

weight control console is a derivative of the common control device (CCD), which is the common command and control station in FCS for unmanned ground and aerial vehicles. If the Army adopts the SMSS, the CCD could be its control.

The interface is simple and intuitive enough for 18- and 19-year-old soldiers to operate: Controls resemble those on a PlayStation. The CCD is linked to the vehicle by radiofrequency spectrum with a 1-mi. range. Lockheed Martin wants to double that.

The vehicle will operate autonomously much of the time, since an infantry squad or special forces team won't have

SMSS robot vehicle is sized for use by infantry squads and special forces teams, and has all-terrain capabilities.



ANDY NATIVI/DEFENSE TECHNOLOGY INTERNATIONAL



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**A remote-controlled prototype is unfazed by rubble in its path.**

increasing. Lockheed Martin says that on average this is almost 150 lb. Though efforts are underway to reduce the load, there is an almost irresistible tendency to add gadgets and systems to the kit. All of the new

electronics and their batteries, smart weapons and body armor burden the troops. But until soldiers become a sort

the manpower to dedicate to the robot. The SMSS can transmit a request for support if it's in a situation that exceeds its decision-making capabilities. Research is underway to program the robot to see, hear and recognize standard voice commands and gestures, a critical function in its role with a squad or team-sized patrol.

Lockheed Martin doesn't see the SMSS as just an equipment carrier. Its real potential, and a priority in derivatives, lies in adapting the vehicle for mission equipment packages and modules that expand capabilities in the field. The basic cargo SMSS can be equipped with a winch, generator, water-purification unit, mast-mounted surveillance system and communication-relay package, and armed with 5.56- or 7.62-mm. machine gun turrets or a 60-mm. mortar.

The idea behind the SMSS is that the gear an infantry soldier carries is

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**Baseline design for Block 0 cargo carrier.**

of cyborg through the use of exoskeletons and power-boost technologies, the warfighter on the ground will have to make do with his muscles when it comes to carrying equipment and weapons.

Soldiers typically deal with heavy loads in a straightforward way, by dumping everything that's not of immediate value. In Vietnam this included body armor and even helmets. In recent years early versions of night-vision goggles, which were bulky and heavy, were left behind.

The Army has long recognized the need to lighten the load. This led to the Mule, a \$300-million program. The Mule, to be fielded in 2013-14, is sophisticated and costly, with a price of around \$300,000 each. The Mule has an articulated suspension, silent hybrid-electric engines, airless "Tweels" from Michelin and all-terrain capabilities.



LOCKHEED MARTIN CONCEPT

The SMSS, in contrast, has a standard drive train, tires and suspension, and features a simple skid-to-turn system.

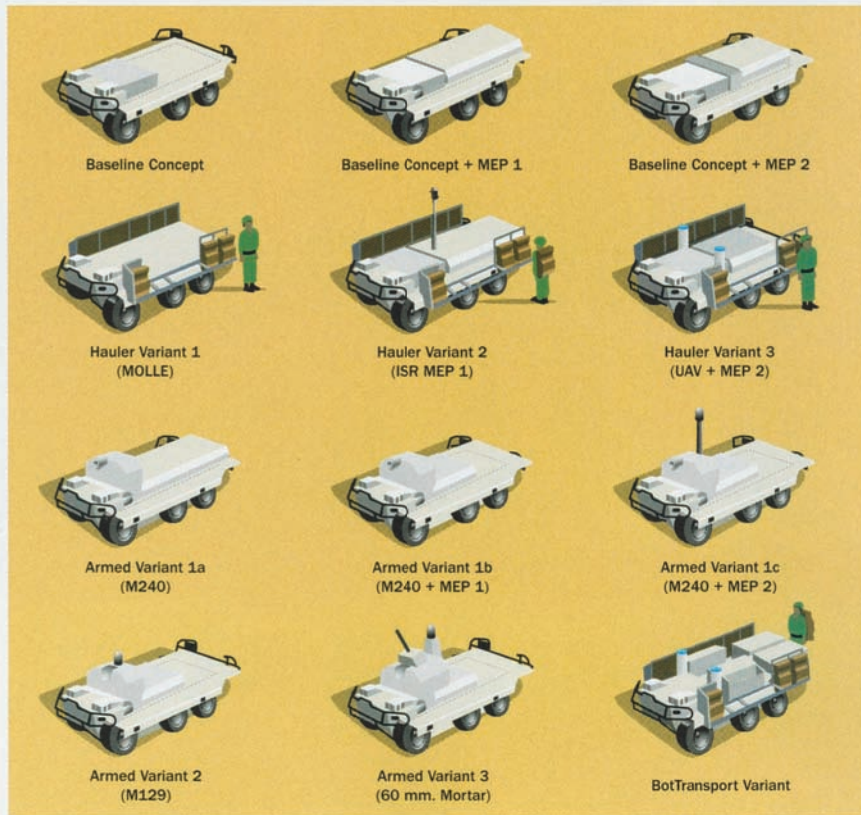
The vehicle has undergone a number of tests and trials, both at Lockheed Martin and by the Army. By 2008 Lockheed had eliminated the need for a human controller on board the SMSS, which was improved and ruggedized and was able to follow a soldier, go to a destination or come to an operator by choosing its route.

The latest version of the vehicle was extensively tested at Ft. Benning, Ga., last September and October and certified as safe. A more evolved configuration, designated Block 0 or Spiral 3,

**Lockheed Martin is evaluating modular configurations, including armed reconnaissance and surveillance versions.**

obtained by upgrading prototypes, was tested during an Army Expeditionary Warrior Experiment trial at Ft. Benning in November and December. This version had advanced capabilities and a broader level of autonomy.

The plan for 2009 is to continue refining the design and testing it with Army and Marine Corps light infantry units. More comprehensive troop tests are expected in 2010, while the first derivative vehicle, a reconnaissance configuration, will join the basic transport vehicle. ■



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